

ATMI-249 DIVRCE

In the Claims

1. (Currently amended) A method of forming a doped A-site deficient manganate material on a substrate from corresponding precursor(s), comprising liquid delivery and flash vaporization thereof to yield a precursor vapor, transporting the precursor vapor to a chemical vapor deposition reactor for chemical vapor deposition formation of the manganate material on the substrate, said manganate material having a formula of $\text{La}_x\text{M}_y\text{MnO}_3$, where $\text{M} = \text{Mg}, \text{Ca}, \text{Sr}, \text{or Ba}$, and $0.5 < (x+y) < 0.9$, and annealing the manganate material in an oxygen atmosphere for a sufficient time period to increase the Curie temperature of the manganate material in a range from 17 °C to about 50°C and wherein the manganate material has a Curie temperature that is between 273 K and 324 K.
2. (Previously Presented) The method according to claim 1, wherein the precursor(s) comprise coordination compounds, or Lewis base complexes of metal(s) selected from the group consisting of lanthanum, magnesium, calcium, strontium, barium, and manganese.
3. (Previously Presented) The method according to claim 1, wherein the precursor(s) include metal β -diketonate compounds, metal pivalate compounds, or Lewis base complexes thereof.
4. (Previously Presented) The method according to claim 1, wherein the precursor(s) include metal fluorinated β -diketonate compounds, or Lewis base complexes thereof.
5. (Previously Presented) The method according to claim 1, wherein the precursor(s) include metal pivalate Lewis base adducts.
6. (Cancelled)
7. (Previously Presented) The method according to claim 1, wherein the precursor(s) are dissolved in a solvent and flash vaporized at a temperature of from about 100 °C to about 300 °C.
8. (Previously Presented) The method according to claim 1, wherein the precursor vapor is transported to the chemical vapor deposition reactor in a carrier gas.

ATMI-249 DIVRCE

9. (Previously Presented) The method according to claim 8, wherein the carrier gas is selected from the group consisting of argon, nitrogen, neon, helium and ammonia.
10. (Previously Presented) The method according to claim 8, wherein the carrier gas is mixed with an oxidizing co-reactant gas in the chemical vapor deposition reactor or prior to transport to the chemical vapor deposition reactor.
11. (Previously Presented) The method according to claim 1, wherein the chemical vapor deposition reactor contains a substrate article heated to a temperature in the range of from about 300 °C to about 1000 °C.
12. (Previously Presented) The method according to claim 11, wherein the pressure of the precursor vapor in the chemical vapor deposition reactor is from about 0.1 to about 760 Torr.
13. (Previously Presented) The method according to claim 1, wherein the chemical vapor deposition is plasma-assisted.
14. (Previously Presented) The method according to claim 1, wherein the precursor(s) comprise a mixture of β -diketonate compounds selected from the group consisting of $\text{La}(\text{thd})_3$, $\text{Ca}(\text{thd})_2$ and $\text{Mn}(\text{thd})_3$.
15. (Previously Presented) The method according to claim 1, wherein the precursor(s) comprise a mixture of β -diketonate compounds selected from the group consisting of $\text{La}(\text{thd})_3$, $\text{Sr}(\text{thd})_2$ and $\text{Mn}(\text{thd})_3$.
16. (Previously Presented) The method according to claim 14, wherein said precursor(s) comprise a mixture of Lewis base adducts of metal β -diketonate precursors.
17. (Previously Presented) The method according to claim 1, wherein M is Ca and said manganate material has A-site deficient stoichiometry, where $(\text{La}+\text{Ca}) < 0.9$.
18. (Cancelled)

ATMI-249 DIV RCE

19. (Previously Presented) The method according to claim 1; wherein M is Sr and said manganate material has A-site deficient stoichiometry, where $(La + Sr) < 0.9$.

20. (Cancelled)

21. (Previously Presented) The method according to claim 1, wherein M is Ba and said manganate material has A-site deficient stoichiometry, where $(La + Ba) < 0.9$.

22.-27. (Cancelled)

28. (Currently amended) The method according to claim 1, wherein ~~said manganate material is annealed in oxygen~~ the deposited films exhibiting a high transition temperature before annealing displays a smaller increase in the Curie temperature upon annealing.

29. (Previously Presented) The method according to claim 17, having a $(La + Ca):Mn$ ratio that is between 0.6 and 0.9.

30. (Previously Presented) The method according to claim 17, having a Ca/La ratio that is between 0.35 and 0.55.

31. (New) The method according to claim 1, wherein the manganate material has a ratio of $(x + y):Mn$ from 0.6 to 0.9.

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